Butterworth Filter Problems

S.P. 14 – C

Design a 5th order Butterworth low pass filter that has a break frequency of 1,100 rad/sec with a minimum gain within the passband of 15dB. Use Sallen-Key amplifiers for the complex conjugate poles, and a first-order low-pass filter of the type in Figure 14.42 of the text for the simple pole.

S.P. 14-D

Design a 4th order high pass Butterworth filter with a break frequency of 1,100 rad/sec with a gain of 15 dB at the break frequency. Use Sallen-Key amplifiers, modified for high-pass operation (i.e., $R \rightarrow 1/sC$ and $1/sC \rightarrow R$)). Hint: you'll probably need a 3rd OpAmp to get the overall gain correct.